Radiance Simulator v1.0 Release Note

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This documentation was developed within the context of the EUMETSAT Satellite Application Facility on Numerical Weather Prediction (NWP SAF), under the Cooperation Agreement dated 29 June 2011, between EUMETSAT and the Met Office, UK, by one or more partners within the NWP SAF. The partners in the NWP SAF are the Met Office, ECMWF, KNMI and Météo France.

Change record			
Version	Date	Author / changed by	Remarks
0.1	24/09/2014	A. Smith	Beta release
0.2	17/10/2014	A. Smith	Updated for DRI
1.0	17/11/2014	A. Smith	Version updated for release

1. DOCUMENTATION

The following documents are relevant to this release. The Release Note and the User Guide are included with the package in PDF format. The other documents are for administrative purposes only.

```
NWPSAF-MO-DS-027-RadSim_ProductSpec.doc
NWPSAF-MO-DS-028-RadSim_TopLevelDesign.doc
NWPSAF-MO-DS-033-RadSim_UserGuide.doc
NWPSAF-MO-TV-036-RadSim_TestPlan.doc
NWPSAF-MO-UD-034-RadSim_ReleaseNote.doc
NWPSAF-RadSim_SDR.doc
```

2. PACKAGE CONTENTS

The Radiance Simulator code is distributed in the gzipped tar file

```
radsim.tar.gz
```

Contents of the unpacked distribution file are listed below (listing is the direct output from the ls –R command). Instructions on building the code can be found in the `readme.txt` file and in the User Guide.

```
build
etc
ls.out
radsim_install
readme.txt
src
user.cfg

./build:
cfg
include

./build/cfg:
common.cfg
gfortran.cfg
ifort.cfg
nagfor.cfg
pgfortran.cfg
xlf.cfg

./doc:
NWPSAF-MO-DS-033-RadSim_UserGuide.pdf
NWPSAF-MO-UD-034-RadSim_ReleaseNote.pdf

./build/include:
radsim_calc_ecmwf_plevels.interface
```

```
radsim_calc_meto_plevels.interface
radsim_calc_pz.interface
radsim_check_ff_packing.interface
radsim_check_fields.interface
radsim_convert_fields.interface
radsim_error_report.interface
radsim_esat.interface
radsim_grid_calc.interface
radsim_grid_init.interface
radsim_grid_rotate.interface
radsim_interp.interface
radsim_interp_horiz.interface
radsim_model_to_rttov.interface
radsim_print_cfg.interface
radsim_print_ob.interface
radsim_qsat.interface
radsim_read_cfg.interface
radsim_read_ecprof60.interface
radsim_read_ecprof91.interface
radsim_read_ff_headers.interface
radsim_read_fieldsfile.interface
radsim_read_grib.interface
radsim_read_obsdata.interface
radsim_read_pp.interface
radsim_set_fields.interface
radsim_set_stash.interface
radsim_setup_rttov.interface
radsim_store_stash.interface
radsim_write_netcdf.interface

./etc:
obsdata_example.txt
radsim_cfg_example.nl

./src:
code
scripts

./src/code:
main
utils

./src/code/main:
radsim.f90
radsim_calc_ecmwf_plevels.f90
radsim_calc_meto_plevels.f90
radsim_check_ff_packing.f90
radsim_check_fields.f90
radsim_convert_fields.f90
radsim_dealloc.f90
```

```
radsim_error_report.f90
radsim_esat.f90
radsim_grid_calc.f90
radsim_grid_init.f90
radsim_grid_rotate.f90
radsim_interp.f90
radsim_interp_horiz.f90
radsim_mod_cfg.f90
radsim_mod_constants.f90
radsim_mod_io.f90
radsim_mod_process.f90
radsim_mod_types.f90
radsim_model_to_rttov.f90
radsim_print_cfg.f90
radsim_print_ob.f90
radsim_qsat.f90
radsim_read_cfg.f90
radsim_read_ecprof60.f90
radsim_read_ecprof91.f90
radsim_read_ff_headers.f90
radsim_read_fieldsfile.f90
radsim_read_grib.f90
radsim_read_obsdata.f90
radsim_read_pp.f90
radsim_set_fields.f90
radsim_set_stash.f90
radsim_setup_rttov.F90
radsim_store_stash.f90
radsim_write_field_nc.f90
radsim_write_netcdf.f90

./src/code/utils:
radsim_calc_pz.f90
radsim_calc_wp.f90
radsim_mod_utils.f90

./src/scripts:
radsim_validate.py
```

3. LIMITATIONS AND KNOWN ISSUES

3.1 Limitations

There are a number of limitations that users should be aware of. Some of these will be addressed in a future release if there is sufficient demand. Most of the items here have already been discussed in other sections of the User Guide.

3.1.1 Input files

Met Office UM data files:

- Packed files are not supported and will not be supported in any future release. The UM ieee routine may be used to unpack the data.
- 32-bit fieldsfiles are not currently supported.

GRIB files:

- Only those originating from ECMWF are supported. This is due to variations in the way fields can be stored, particularly with regard to pressure levels. Support for other sources may be added in future releases.

netCDF files:

- No support planned but may be added if there is a new requirement.

3.1.2 Processing options

The following processing options are not supported but some may be added in a future release:

- Interpolation of irregular grids, i.e., those that don't have a fixed lat,lon spacing between grid points. Simulations will take place on the original grid.
- The effects of reflected solar radiation in the IR.
- Use of variable trace gas (CO2, N2O, CO, CH4) profiles.
- Use of aerosol profiles.

3.1.3 General

- No special consideration is given to the interpolation of surface fields near coastlines, hence one might occasionally get unrepresentative values of, for example, surface skin temperature at such points.
- Heavy load simulations, using **large numbers of channels** (e.g., all IASI channels) for a large number of profiles, may fail if there is insufficient memory available. If this proves to be a widespread problem, the options for a low memory version of the code will be investigated. A viable workaround would be to do several runs with subsets of channels. Note that memory usage can be reduced by not writing out channel-dimensioned arrays such as emissivity and Jacobians, however none of these are written out by default.

3.2 Known Issues

The following is a list of known problems that will be addressed in a future release. Please report any additional problems via the NWP SAF helpdesk feedback form at http://nwpsaf.eu/feedback.html.

The following are not handled correctly:

- Interpolation of staggered grids. This applies only to the components of the surface wind field which are currently assumed to be coincident with the regular grid. Surface wind is only used for MW emissivity calculations over sea-surfaces. This usually has

only a minor effect on results and is not an important factor in general for radiance simulation.

- Rotation of vector fields. This applies only to the surface wind field. Affected simulations are those from a limited area model with rotated pole and for polarised microwave channels that have a significant surface contribution. Other combinations are unaffected.

The following bugs have been identified:

- Half-level pressures are not written out if profile data is requested in the output file.